



[4910-13]

**DEPARTMENT OF TRANSPORTATION**

**Federal Aviation Administration**

**14 CFR Part 23**

**[Docket No.FAA-2018-0918; Notice No. 23-291-SC]**

**Special Conditions: Innovative Solutions & Support, Inc.; Textron Aviation, Inc. Model B200-Series Airplanes; Autothrust Functions**

**AGENCY:** Federal Aviation Administration (FAA), DOT.

**ACTION:** Final special conditions.

**SUMMARY:** These special conditions are issued for Textron Aviation, Inc. B200-series airplanes. These airplanes as modified by Innovative Solutions & Support, Inc., will have a novel or unusual design feature associated with an autothrust system. The applicable airworthiness regulations do not contain adequate or appropriate safety standards for this design feature. These special conditions contain the additional safety standards the Administrator considers necessary to establish a level of safety equivalent to that established by the existing airworthiness standards.

**DATES:** These special conditions are effective **[INSERT DATE OF PUBLICATION IN FEDERAL REGISTER]**.

**FOR FURTHER INFORMATION CONTACT:** Jeff Pretz, AIR-691, Regulations & Policy Section, Small Airplane Standards Branch, Policy & Innovation Division, Aircraft Certification Service, Federal Aviation Administration, 901 Locust; Kansas City, Missouri 64106; telephone (816) 329-3239; facsimile (816) 329-4090; email [Jeff.Pretz@faa.gov](mailto:Jeff.Pretz@faa.gov).

## **SUPPLEMENTARY INFORMATION:**

### **Background**

On December 14, 2017, Innovative Solutions & Support, Inc. (Innovative Solutions), applied for a supplemental type certificate for installation of an autothrust system (ATS)—also known as an autothrottle system—in Textron Aviation, Inc., (Textron) B200-series airplanes. The B200-series airplanes are powered by two Pratt & Whitney PT6A turbo-propeller engines—depending on airplane model—that can carry thirteen passengers, including two flightcrew members. These airplanes have a service ceiling up to 35,000-feet and a maximum takeoff weight of up to 12,500 pounds in the normal category. These airplanes are approved for single-pilot operation.

The installation of an ATS in Textron B200-series airplanes is intended to reduce pilot workload. The ATS is useable in all phases of flight except below decision height on approach. The system includes torque control and airspeed modes along with monitors to prevent the system from exceeding critical engine or airspeed limits. Throttle movement is provided by a stepper motor acting through a linear actuator, which acts as a link between the stepper motor and throttle. The liner actuator can be overridden by pilot movement of the throttle and automatically disengages upon disagreement in the expected throttle position versus its actual position.

Section 23.1329, amendment 23-49, only contained requirements for automatic pilot systems that act on the airplane flight controls. Autothrust systems are automatic systems that act on the thrust controls. These systems provide enhanced automation and safety, but may also introduce pilot confusion, countering the safety benefit. Transport Airplane regulation 14 CFR 25.1329, amendment 25-119, addresses these concerns. Therefore, these special conditions are

based on § 25.1329 and provide additional requirements to standardize the pilot interface and system behavior and enhance pilot awareness of system active and armed modes.

### **Type Certification Basis**

Under the provisions of § 21.101, Innovative Solutions must show that B200-series airplanes, as changed, continue to meet the applicable provisions of the regulations incorporated by reference in Type Certificate (TC) No. A24CE<sup>2</sup> or the applicable regulations in effect on the date of application for the change. The regulations incorporated by reference in the type certificate are commonly referred to as the "original type certification basis." The regulations incorporated by reference in TC No. A24CE are as follows: 14 CFR part 23, amendments 23-1 through 23-9, plus various later part 23 amendments—depending on the model and serial number of the airplane—as noted on Type Certification Data Sheet A24CE.

If the Administrator finds the applicable airworthiness regulations (i.e., 14 CFR part 23) do not contain adequate or appropriate safety standards for B200-series airplanes because of a novel or unusual design feature, special conditions are prescribed under the provisions of § 21.16.

Special conditions are initially applicable to the model(s) for which they are issued. Should the applicant apply for a supplemental type certificate to modify any other model included on the same type certificate to incorporate the same or similar novel or unusual design feature, the FAA would apply these special conditions to the other model under § 21.101.

In addition to the applicable airworthiness regulations and special conditions, B200-series airplanes must comply with the fuel vent and exhaust emission requirements of 14 CFR part 34 and the noise certification requirements of 14 CFR part 36.

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<sup>2</sup> See <http://rgl.faa.gov/>

The FAA issues special conditions, as defined in 14 CFR 11.19, in accordance with § 11.38, and they become part of the type-certification basis under § 21.101.

### **Novel or Unusual Design Features**

Textron B200-series airplanes will incorporate the following novel or unusual design features:

Autothrust system, which provides commands to two linear actuators, one attached to each throttle lever, that automatically control thrust on each engine. The autothrust system can be operated in either Torque Control Mode or Airspeed Mode.

### **Discussion**

The part 23 airworthiness regulations in the type certification basis do not contain appropriate safety standards for an ATS installation; hence, the need for special conditions. However, part 25 regulations contain appropriate airworthiness standards; therefore, these special conditions are derived from § 25.1329, amendment 25-119. Sections 23.143, amendment 23-50, and 23.1309, amendment 23-62, would be used instead of the corresponding part 25 regulations referenced in § 25.1329.

### **Discussion of Comments**

Notice of proposed special conditions No. 23-18-03-SC for Textron B200-series airplanes was published in the Federal Register on October 26, 2018.<sup>3</sup> We received comments from two commenters.

An individual commenter requested that we clarify the wording of or include definitions for “normal,” rare-normal,” and “non-normal” conditions to establish a clear intent relating to the

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<sup>3</sup> See 83 FR 54057

probability of significant transients instead of using 14 CFR part 25 language. In support of this request, the commenter stated that because the special conditions do not define “normal,” “rare-normal,” and “non-normal” conditions in reference to allowable transients, this results in an undefined probability of “non-fatal injuries” as contained in the significant transient definition in paragraph 1(l)(2) of the proposed special condition.

We agree and clarify the terms “normal,” “rare-normal,” and “non-normal” in these special conditions. These terms are defined in Advisory Circular 25.1329-1C, “Approval of Flight Guidance Systems.” Retaining common terms and definitions—when possible—across product lines for standardization are beneficial to all stakeholders. We have added footnotes to the terms in the special conditions language to identify where the definitions may be found.

Another individual commenter supports these special conditions. However, the commenter requests specific information about the safety hazards.

Additional information about safety hazards and the considerations that should be made when conducting a safety assessment may also be found in Advisory Circular 25.1329-1C. We did not make any changes to the proposed special conditions based on this comment.

Except for the change previously discussed, these special conditions are adopted as proposed.

### **Applicability**

As discussed above, these special conditions are applicable to Textron B200-series airplanes. Should Innovative Solutions apply at a later date for a supplemental type certificate to modify any other model included on TC No. A24CE to incorporate the same novel or unusual design feature, the FAA would apply these special conditions to that model as well.

Under standard practice, the effective date of final special conditions would be 30 days after the date of publication in the Federal Register; however, as the supplemental type certification date for the Textron Aviation B200 series airplanes is imminent, pursuant to 5 U.S.C. 553(d) the FAA finds that good cause exists to make these special conditions effective upon issuance.

## **Conclusion**

This action affects only certain novel or unusual design features on one model series of airplanes. It is not a rule of general applicability and it affects only the applicant who applied to the FAA for approval of these features on the airplane.

## **List of Subjects in 14 CFR Part 23**

Aircraft, Aviation safety, Signs and symbols.

The authority citation for these special conditions is as follows:

**Authority:** 49 U.S.C. 106(f), 106(g), 40113, 44701-44702, 44704, Pub. L. 113-53, 127 Stat. 584 (49 U.S.C. 44704) note.

## **The Special Conditions**

Accordingly, pursuant to the authority delegated to me by the Administrator, the following special conditions are issued as part of the type certification basis for Textron Aviation, Inc., B200-series airplanes, as modified by Innovative Solutions & Support, Inc.

### **1. Autothrottle System**

In addition to the requirements of §§ 23.143, 23.1309, and 23.1329, the following apply:

(a) Quick disengagement controls for the autothrust functions must be provided for each pilot. The autothrust quick disengagement controls must be located on the thrust control

levers. Quick disengagement controls must be readily accessible to each pilot while operating the thrust control levers.

(b) The effects of a failure of the system to disengage the autothrust functions when manually commanded by the pilot must be assessed in accordance with the requirements of § 23.1309.

(c) Engagement or switching of the flight guidance system, a mode, or a sensor may not cause the autothrust system to affect a transient response that alters the airplane's flight path any greater than a minor transient, as defined in paragraph 1(l)(1) of this section.

(d) Under normal conditions<sup>4</sup>, the disengagement of any automatic control function of a flight guidance system may not cause a transient response of the airplane's flight path any greater than a minor transient.

(e) Under rare normal and non-normal conditions<sup>5</sup>, disengagement of any automatic control function of a flight guidance system may not result in a transient any greater than a significant transient, as defined in paragraph 1(l)(2) of this section.

(f) The function and direction of motion of each command reference control, such as heading select or vertical speed, must be plainly indicated on, or adjacent to, each control if necessary to prevent inappropriate use or confusion.

(g) Under any condition of flight appropriate to its use, the flight guidance system may not produce hazardous loads on the airplane, nor create hazardous deviations in the flight

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<sup>4</sup> Normal conditions are defined in Advisory Circular 25.1329-1C, Approval of Flight Guidance Systems. You may find a copy of this document at <http://rgl.faa.gov/>.

<sup>5</sup> Rare normal and non-normal conditions are defined in Advisory Circular 25.1329-1C, Approval of Flight Guidance Systems. You may find a copy of this document at <http://rgl.faa.gov/>.

path. This applies to both fault-free operation and in the event of a malfunction, and assumes the pilot begins corrective action within a reasonable period of time.

(h) When the flight guidance system is in use, a means must be provided to avoid excursions beyond an acceptable margin from the speed range of the normal flight envelope. If the airplane experiences an excursion outside this range, a means must be provided to prevent the flight guidance system from providing guidance or control to an unsafe speed.

(i) The flight guidance system functions, controls, indications, and alerts must be designed to minimize flight crew errors and confusion concerning the behavior and operation of the flight guidance system. Means must be provided to indicate the current mode of operation, including any armed modes, transitions, and reversions. Selector switch position is not an acceptable means of indication. The controls and indications must be grouped and presented in a logical and consistent manner. The indications must be visible to each pilot under all expected lighting conditions.

(j) Following disengagement of the autothrust function, a caution (visual and auditory) must be provided to each pilot.

(k) During autothrust operation, it must be possible for the flightcrew to move the thrust levers without requiring excessive force. The autothrust may not create a potential hazard when the flightcrew applies an override force to the thrust levers.

(l) For purposes of this section, a transient is a disturbance in the control or flight path of the airplane that is not consistent with response to flight crew inputs or environmental conditions.

(1) A minor transient would not significantly reduce safety margins and would involve flightcrew actions that are well within their capabilities. A minor transient may



involve a slight increase in flight crew workload or some physical discomfort to passengers or cabin crew.

(2) A significant transient may lead to a significant reduction in safety margins, an increase in flight crew workload, discomfort to the flightcrew, or physical distress to the passengers or cabin crew, possibly including non-fatal injuries. Significant transients do not require, in order to remain within or recover to the normal flight envelope, any of the following:

- (i) Exceptional piloting skill, alertness, or strength.
- (ii) Forces applied by the pilot that are greater than those specified in § 23.143(c).
- (iii) Accelerations or attitudes in the airplane that might result in further hazard to secured or non-secured occupants.

Issued in Kansas City, Missouri on December 17, 2018.

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